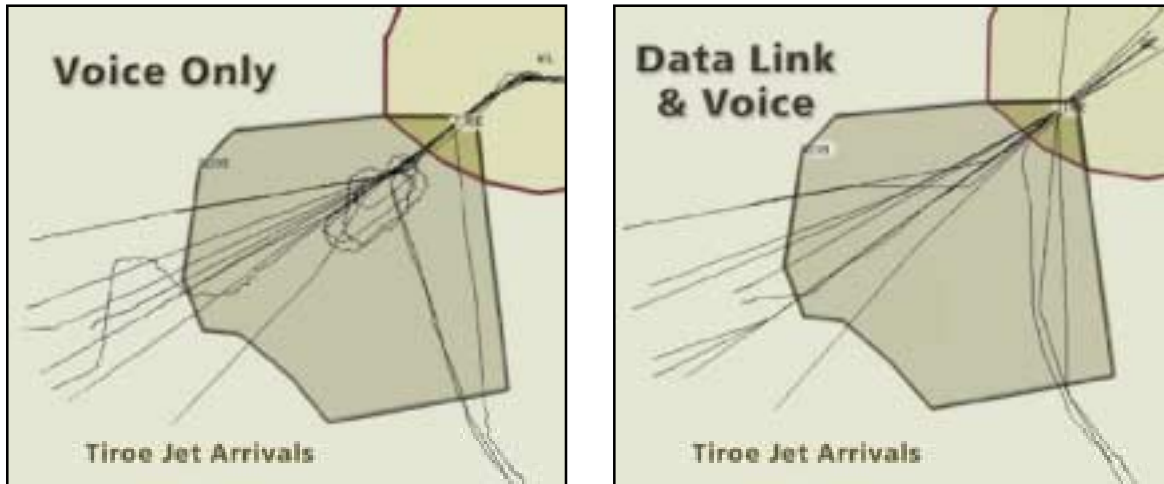


ER-3: Reduce Voice Communication

Reduce flow constraints by reducing voice communications workload.



Background

Pilots and radar controllers work together through voice communications to manage the flow of air traffic through the NAS in a safe and efficient manner. Structured sets of phrases have been developed for exchanging information and clearances, and for making requests. Standard phraseology is used to mitigate some of the limitations of oral communications. A number of the exchanges between pilots and controllers involve the exchange of routine information that is repeated for most aircraft entering or exiting a sector.

From a safety perspective, the primary sources of communication problems between controllers and pilots include: acoustic confusion; transposition of alphanumerics; “read-back” and “hear-back” errors; overlapping or simultaneous transmissions; misinterpretation caused by poor pronunciation; failure to use standard phraseology; manual data entry errors; and improper or malfunctioning radio keying operation. These communication failures contribute to a significant percentage of operational errors as well as reducing overall NAS efficiency.

As demand for access to the NAS increases, sectors shrink and the number of potential trajectory conflicts increase causing the controller-pilot communications burden to increase at a faster rate. In addition, the clearances needed for flexible routing, congestion management, and weather avoidance necessitate the exchange of complex route information between controllers and pilots not easily supported by oral communication. The provision of air traffic services via the use of data communications is a key means of addressing the safety, efficiency, and capacity constraints of the current voice communications-based NAS.

Ops Change Description

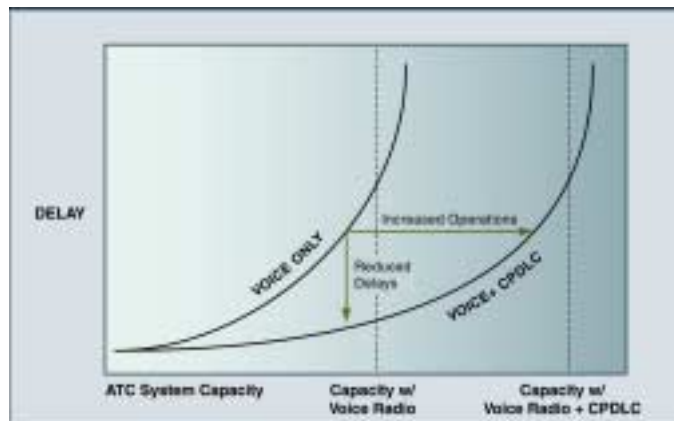
One of the key operational changes to reduce voice communication workload underway in the domestic en route environment is the use of the Aeronautical Data Link System (ADLS). ADLS has as its leading application Controller-Pilot Data Link Communications (CPDLC). The use of CPDLC is initially intended to replace routine communications (Build I), to transmit speed, heading, and altitude clearances to pilots through data communications and to allow pilots to request altitude changes (Build IA). These capabilities will allow controllers to better distribute communications responsibilities among all members of the sector team. This change permits optimal use of the voice communications channel and increases sector productivity. The implementation of CPDLC Builds I and IA also involves the introduction of an Aeronautical Telecommunication Network (ATN) intended to become the standard global mechanism for data communications.

Augmenting CPDLC Builds I and IA, the next incremental changes introduced through ADLS will be the ability of controllers to send conflict-free routes developed on the User Request Evaluation Tool (URET) via CPDLC without re-entry.

Benefit, Performance and Metrics

Reduced voice communications workload and distributed communications responsibility combine to provide the following benefits. Note that benefits increase as user equipage increases:

- Enhanced safety reflected by decreased operational errors and increased communications accuracy.
- Increased flight efficiency reflected by less time and fewer miles flown in sector (demonstrated decrease in controller experiment using Atlanta's TIROE arrival sector with a 90% equipage level).
- Increased airspace capacity reflected by increased sector traffic throughput (miles in trail restrictions relaxed in an experimental sector based on voice communication reduction) and reduced delay (see chart below).



FAA, *User Benefits of Two-Way Data Link Air Traffic Control Communications Aircraft Delay and Flight Efficiency in Congested En Route Airspace.*

FAA, *Benefits of Controller-Pilot Data Link ATC Communications in Terminal Airspace.*

Scope and Applicability

- CPDLC is intended for use in en route airspace and requires a commercially provided digital air-ground infrastructure. Airspace users require proper equipment to use the service.
- Customer demand and equipment will drive service coverage and benefits.
- Initial data link (CPDLC Build I) will be deployed to Miami Air Route Traffic Control Center (ARTCC) in 2002 with four services: Transfer of Communication, Initial Contact, Altimeter Setting, and Predefined Instructions via Menu Text.
- Enhanced data link (CPDLC Build IA) extends data link capability to all 20 domestic ARTCCs beginning in 2003 and adds the following services: Altitude Assignment, Speed Assignment, Heading Assignment, Route Clearance, and Pilot Initiated Downlink.

Key Decisions

- CPDLC communications will not be effective unless VDL-2 coverage is available across a significant portion of the NAS in order to make equipment cost-effective. If coverage is insufficient, users may not equip and controllers may not be able to utilize the capability.
- Airspace users need to make their requirements known to their commercial communications service providers.
- Members of the user community must make decisions to equip aircraft with the needed avionics. The rate of equipment is critical, because benefits from CPDLC are accrued when there is a significant percentage of equipped users in the airspace.

Key Risks

- System elements developed independently by stakeholders (e.g., FAA, ATN software vendors, avionics manufacturers, commercial communications service providers, and other air traffic service providers) must be interoperable.
- VDL-2 coverage of the NAS drives benefits. VDL-2 has not been deployed, and adequate coverage has not been validated to ensure contiguous communications.
- Experience is limited in the certification of cooperative air-ground systems. There is a need to acknowledge and credit the use of legacy and COTS systems and software in the end-to-end certification process.
- CPDLC represents a significant change in the human factors in the cockpit and the sector team and their interaction. This will require attention to ensure successful implementation.